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COMPLETE SPECIFICATION

Improvements in or relating to Toy and Model Vehicles

We, LESNEY PRODUCTS & CO. LIMITED, a British Company, of Eastway, Hackney Wick, London, E.9., do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to toy and model vehicles. It is an object of the invention to provide such toys or models with a cheap, simple and reliable form of wheel suspension which simulates the action of the suspension of a full-size vehicle.

According to a first aspect of the invention, there is provided a toy or model vehicle comprising a body, a chassis and two or more wheel-carrying axles, two or more of which axles are arranged so as to be movable substantially vertically relative to the chassis between predetermined upper and lower limits and so as to bear against a single strip-shaped resilient member, the construction and arrangement of the resilient member being such that it urges the corresponding axles resiliently towards the corresponding lower limits, but such that it can be deflected resiliently to allow movement of the axles towards the corresponding upper limits, and wherein the resilient member is connected to the vehicle body, a body insert or the chassis and to the axles, the connections being exclusively by abutting engagements.

According to a second aspect of the invention, there is provided a toy or model vehicle comprising a body, a chassis and two or more wheel-carrying axles, two or more of which axles are arranged so as to be movable substantially vertically relative to the chassis between predetermined upper and lower limits and so as to bear against two or more resilient members each bearing against a corresponding single one of the axles, the construction and arrangement of each resilient member being such that it urges the corresponding axle resiliently towards the corresponding lower limits,

but such that it can be deflected resiliently to allow movement of the axle towards the corresponding upper limits, and wherein the resilient members are connected to the vehicle body, a body insert or the chassis and to the corresponding axles, the connections being exclusively by abutting engagements.

For a better understanding of the invention, one constructional embodiment in accordance with each aspect thereof will now be further described by way of example with reference to the accompanying drawings, in which:—

Figure 1 is a sectional side elevation of a toy or model saloon car,

Figure 2 is a section taken on the line II—II of Figure 1,

Figure 3 is a sectional view taken on the line III—III of Figure 1 but shows only those parts that are relevant to the present invention,

Figure 4 is a part-sectional side elevation of a toy lorry, and

Figure 5 is a sectional view to an enlarged scale, taken on the line V—V of Figure 4 but shows only those parts that are relevant to the present invention.

Referring to Figures 1 to 3 of the drawings, the toy or model vehicle has a die cast metal body which is generally indicated by the reference numeral 1 and which simulates the body of a well-known make of full-size car. Since the body itself does not form a feature of the invention, it is only shown in outline in the drawings. A body insert in the form of a synthetic plastics moulding 2 is disposed within the interior of the body 1 and simulates the floor, front and rear seats, steering column, front fascia panel and rear window shelf of the car. Once again, those details of the part 2 which are not of importance to the invention are not shown in the drawings. A further synthetic plastics moulding (not shown) is disposed above the moulding 2, this moulding being of a transparent material which is tinted green so as to simulate the windscreen

and side and rear windows of the car. The moulding 2 is a close fit laterally of the body 1 so that it does not tend to move from side-to-side and it is prevented from moving longitudinally of the body 1 by means of a rib 3 that forms part of the body and that lies immediately in front of the fascia panel of the moulding 2 and by a tongue 5 of the moulding 2 which bears against the root of a downwardly projecting post 4 also forming part of the body 1.

The lowermost side of the moulding 2 is formed with two laterally extending but longitudinally spaced ribs 6 and also with a pair of ribs 7 and a pair of pins 8. The ribs 7 extend longitudinally of the car for a short distance and are spaced apart laterally of the car by a distance approximately equal to the length of each rib 6. The pins 8 are spaced apart laterally of the car by the same distance as are the ribs 7.

A resilient member in the form of a synthetic plastics strip 9 extends longitudinally of the toy or model car beneath the moulding 2 and is formed on its uppermost side with a transverse rib 10 that is entered between the two ribs 6 to prevent the strip 9 from moving longitudinally relative to the moulding 2. Lateral movement of the strip 9 is prevented by virtue of the fact that it lies between the two ribs 7 and also between the two pins 8, the distances between these parts being approximately the same as the width of the strip 9.

The toy or model car is completed by a metallic chassis taking the form of a mainly flat plate 11. The leading end of the plate 11 is provided with a tongue 12 that is entered in a slot 13 formed at the front of the body 1. A hole 14 is formed through the plate 11 towards the end thereof remote from the tongue 12 and, as can be seen in Figure 1, the free end of the post 4 is entered through this hole. During the assembly of the toy or model, the free end of the post 4, which is formed with an internally tapering bore, is punched out or otherwise expanded so that it is given a lip of greater diameter than the diameter of the hole 14. This effectively secures the plate 11 to the body 1 in such a way as to prevent accidental or inadvertent detachment of one from the other. The uppermost side of the plate 11 is formed with two shallow upstanding walls 15 that extend generally longitudinally of the toy or model at the opposite longitudinal edges of the plate 11 in front and rear regions of that plate. As can be seen in Figure 2, the walls 15 are spaced inwardly from said edges of the plate 11 in a central region of the plate. The walls 15 are formed with pairs of shoulders 16 that are disposed immediately in front and to the rear of the ribs 7 and pins 8 respectively. The free ends of the ribs 7 and pins 8 abut against the uppermost side

of the plate 11 and the arrangement is such that the shoulders 16 assist the ribs 3 and post 4 in preventing longitudinal movement of the moulding 2 relative to the body 1 and plate 11.

At their opposite ends, the walls 15 project upwardly in the form of lugs 17, each lug 17 being formed with a substantially vertically extending slot 18. An axle 19 is entered transversely through each pair of slots 18, the plate 11 being shaped to conform to the profiles of the axles 19 in two regions extending transversely between the lowermost ends of each pair of slots 18. The opposite ends of each axle 19 carry two freely rotatable wheels 20 and it will be evident from the drawings that none of these wheels are steerable so that the toy or model can move only in a straight line.

A central region of the lowermost side of the strip 9 bears against the plate 11 between the walls 15 and both the axles 19 have central regions which bear against opposite end regions of the lowermost side of the strip 9. As can be seen in Figure 1, the strip 9 is thus resiliently deformed to a slight extent in such a way that both the axles 19 are urged resiliently downwardly towards the lower limits afforded by the lowermost ends of the slots 18 and the correspondingly shaped regions of the plate 11. The natural resiliency of the strip 9 is, in fact, such that both axles 19 are normally retained in contact with these lower limits. However, upon an additional load being placed upon the body 1 by, for example, finger pressure, at least one end of the strip 9 will be still further deflected resiliently to allow one axle 19, or both axles 19, to move upwardly of the slots 18 towards upper limits afforded by the uppermost ends of said slots. It will be evident that one, two or more of the wheels 20 will be retracted upwardly into the body 1 in a manner simulating the action of the wheel suspension of a full-size vehicle. The number and location of the wheels 20 affected will depend upon the point of application and magnitude of the pressure and, as soon as this pressure is released, the strip 9 will urge the axles 19 back into the normal position which can be seen best in Figure 1 of the drawings.

The synthetic plastics material from which the moulding 2 and the strip 9 are formed is preferably polystyrene and it will be apparent that, since no complicated assembly techniques are necessary, the invention affords a cheap, simple and reliable form of wheel suspension for toy or model vehicles. It should be noted that the strip 9 is connected to the chassis plate 11 and axles 19 in a non-positive manner exclusively by abutting engagements. This has the substantial advantage that it avoids the step of making a positive connection, for example to the chassis by a rivet, during assembly of the toy or model.

Referring to Figures 4 and 5 of the drawings, the toy or model lorry which is illustrated has a die cast metal chassis which is generally indicated by the reference numeral 21 and a cab which is generally indicated by the reference numeral 22. The chassis 21 and cab 22 simulate the corresponding parts of a well-known make of full-size lorry but, since their construction does not form a feature of the invention, it is again not shown in any detail. Moreover, the lorry illustrated is intended to have a tippable container mounted on the chassis 1 to the rear of the cab 22. This has been entirely omitted from the drawings for the sake of simplicity.

The lorry has four pairs of wheels 23, 24, 25 and 26 each of which are freely rotatably mounted at the opposite ends of one of four corresponding axles 27, 28, 29 and 30. The wheels are not arranged to be steerable. As can be seen in Figure 5 in respect of the axle 30, each of the four axles 27 to 30 has opposite end regions thereof entered through vertically extending slots 31 formed in lugs 32 integral with, or rigidly secured to, the chassis 21. The opposite end regions of each of the axles 27 to 30 are movable substantially vertically relative to the chassis 21 between predetermined upper and lower limits defined by the uppermost and lowermost ends of the corresponding slots 31.

Resilient synthetic plastics members generally indicated by the reference numeral 33 are provided in respect of the leading axle 27 and rearmost axle 30 of the lorry, the member 33 corresponding to the axle 27 not being visible in the drawings. Each of the two members 33 has two resilient leaves 34 projecting symmetrically from opposite sides of a central boss 35. The boss 35 is formed on its uppermost side with a square or other non-circular recess in which is entered a dowel 36 of matching cross-section carried by a block 37 forming part of a transverse member of the chassis 21. In the case of the member 33 co-operating with the axle 27, the dowel 36 is supported by a floor plate of the cab 22.

The free ends of the leaves 34 of each member 33 bear against the opposite end regions of the corresponding axle immediately alongside the corresponding two lugs 32 and, as can be seen in Figure 5, urge both said opposite end regions downwardly into contact with the lower limits afforded by the lowermost ends of the slots 31. The connection between the dowel 36 and the recess in the boss 35 prevents each member 33 from turning about the corresponding dowel 36 so that the opposite ends of the leaves 34 are maintained in contact with the axles 27 and 30.

In the use of the toy lorry, a downward pressure upon its chassis 21 and/or cab 22, causes resilient deformation of one or both of the leaves 34 of one or both of the two

members 33 so that one, two, three or four of the four opposite end regions of the two axles 27 and 30 can move upwardly towards the upper limits afforded by the slots 31. Upon removal of the pressure, the resiliency of the deformed leaf or leaves 34 immediately restores approximately the illustrated positions of the various parts 23, 26, 27, 30 and 33.

The axles 28 and 29 are freely movable substantially vertically in the corresponding slots 31 and, obviously, always take up positions dictated by the levels of the points of contact of the wheels 24 and 25 with the ground or other surface upon which the toy lorry is standing or being moved. In fact, the strength of the resilient leaves 34 of the two members 33 is not very great so that, when the toy is being moved rapidly over a somewhat rough surface, all four of the axles 27 to 30 move upwardly and downwardly in the slots 31 thus imparting a surprisingly realistic motion to the revolving wheels 23 to 26.

The synthetic plastics material from which the members 33 are formed is preferably polystyrene. The members 33 are placed in their appointed positions immediately prior to the insertion of the axles 27 and 30 through the corresponding slots 31 and, once again, are non-positively connected to the chassis and axles exclusively by abutting engagements. The embodiment of the invention which has been described with reference to Figures 4 and 5 can equally well be applied to toy or model vehicles, such as cars, having only two axles. In this case, each axle co-operates with a corresponding member 33. Moreover, a three, four or other multiple-axled toy or model vehicle may have any two or more of said axles provided with members 33 in dependence upon the requirements of the particular toy or model.

WHAT WE CLAIM IS:—

1. A toy or model vehicle comprising a body, a chassis and two or more wheel-carrying axles, two or more of which axles are arranged so as to be movable substantially vertically relative to the chassis between predetermined upper and lower limits and so as to bear against a single strip-shaped resilient member, the construction and arrangement of the resilient member being such that it urges the corresponding axles resiliently towards the corresponding lower limits, but such that it can be deflected resiliently to allow movement of the axles towards the corresponding upper limits, and wherein the resilient member is connected to the vehicle body, a body insert or the chassis and to the axles, the connections being exclusively by abutting engagements.

2. A toy or model vehicle comprising a body, a chassis and two or more wheel-carrying axles, two or more of which axles are arranged so as to be movable substantially vertically relative to the chassis between predetermined upper and lower limits and so as

- to bear against two or more resilient members each bearing against a corresponding single one of the axles, the construction and arrangement of each resilient member being such that it urges the corresponding axle resiliently towards the corresponding lower limits, but such that it can be deflected resiliently to allow movement of the axle towards the corresponding upper limits, and wherein the resilient members are connected to the vehicle body, a body insert or the chassis and to the corresponding axles, the connections being exclusively by abutting engagements.
3. A toy or model vehicle as claimed in claim 1 or 2, wherein the or each resilient member is formed from a synthetic plastics material.
4. A toy or model vehicle as claimed in claim 3, wherein the material is polystyrene.
5. A toy or model vehicle as claimed in any preceding claim, wherein the upper and lower limits are afforded by the uppermost and lowermost ends of pairs of slots through which the axles are entered.
6. A toy or model vehicle as claimed in claim 5, wherein said slots are formed in lugs integral with, or rigidly secured to, the chassis.
7. A toy or model vehicle as claimed in claim 1, wherein the single strip-shaped resilient member extends substantially longitudinally of the toy or model vehicle and is arranged to bear against central regions of at least two transverse axles, said axles being disposed towards relatively opposite ends of the resilient member.
8. A toy or model vehicle as claimed in claim 7, wherein the resilient member is formed approximately midway along its length with an upstanding transverse rib and wherein said rib is entered between two similar but downwardly projecting ribs carried by a body insert.
9. A toy or model vehicle as claimed in claim 8, wherein the body insert is provided with pairs of downwardly projecting members, the members in each pair being spaced apart by a distance approximately equal to the width of the strip-shaped resilient member, and wherein the resilient member is entered between the projecting members and is prevented from moving laterally thereby.
10. A toy or model vehicle as claimed in claim 9, wherein the downwardly projecting members take the form of a pair of pins and a pair of ribs.
11. A toy or model vehicle as claimed in claim 9 or 10, wherein the downwardly projecting members are arranged to co-operate with upwardly projecting parts of the chassis to prevent longitudinal movement of the body insert relative to the body and chassis.
12. A toy or model vehicle as claimed in claim 2, wherein each of the two or more resilient members is arranged to bear against opposite end regions of a corresponding single one of the axles.
13. A toy or model vehicle as claimed in claim 12, wherein each resilient member has a central boss and two resilient leaves projecting symmetrically from opposite sides of the boss.
14. A toy or model vehicle as claimed in claim 13, wherein the central boss is formed with a non-circular recess that co-operates with a dowel of matching cross-section rigid with the body, body insert or chassis of the vehicle.
15. A toy or model vehicle as claimed in any one of claims 12 to 14, wherein the number of vertically or substantially vertically movable axles exceeds the number thereof in respect of which corresponding resilient members are provided.
16. A toy or model vehicle having a wheel suspension substantially as hereinbefore described with reference to Figures 1 to 3 of the accompanying drawings.
17. A toy or model vehicle having a wheel suspension substantially as hereinbefore described with reference to Figures 4 and 5 of the accompanying drawings.

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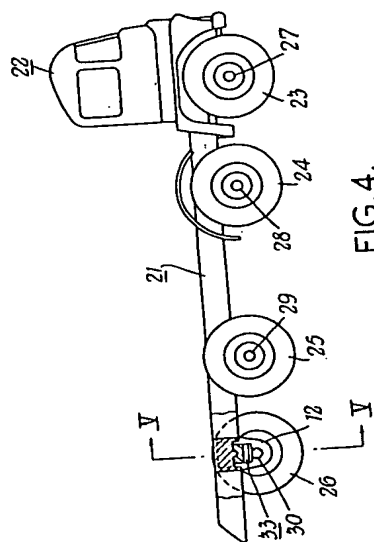


FIG. 4.

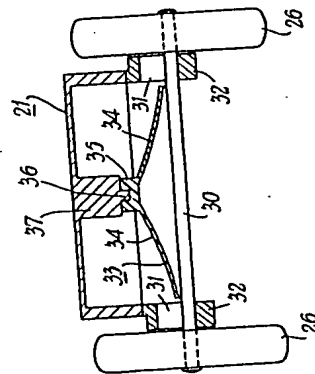


FIG. 5.

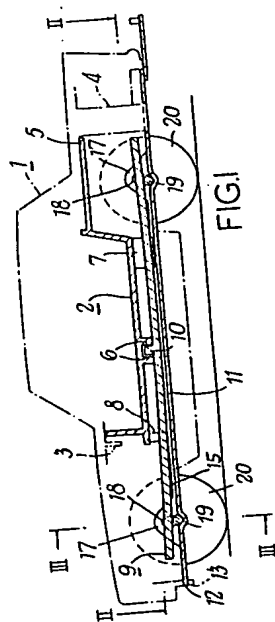


FIG. 1.

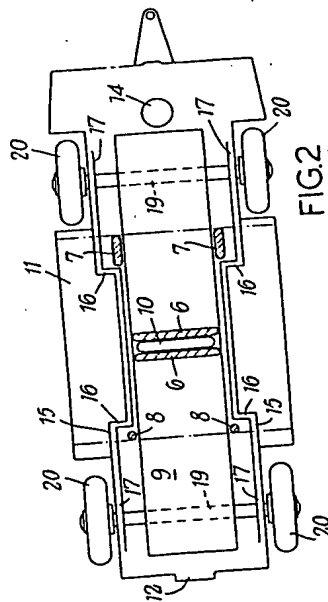


FIG. 2.

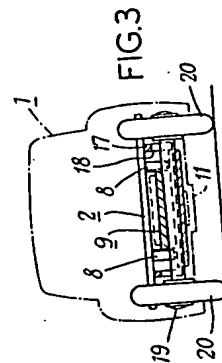


FIG. 3.